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# EXPERIMENTAL GRAPHICS USERS' GUIDE

11 JUN 76

SRI-ARC

Augmentation Research Center  
Stanford Research Institute  
Menlo Park, California 94025



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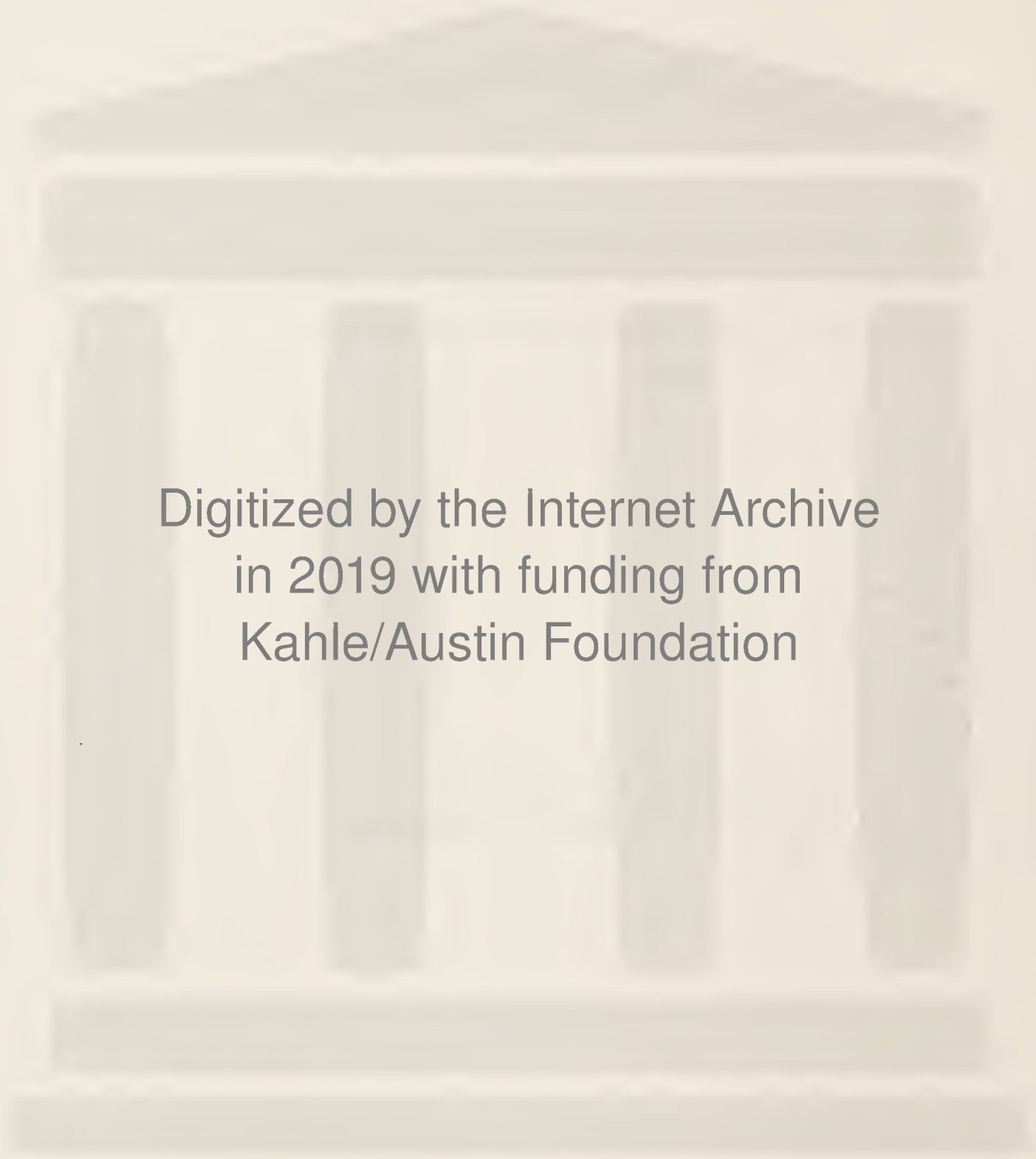
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## INTRODUCTION

The graphics capability of NLS enables you to write, display, and output diagrams containing line drawings and text labels. Diagrams may also be printed through a photocomposition device, combined with the text of the NLS statements. Diagrams and the text of NLS statements are stored in the same NLS file. It is necessary to use DNLS with special graphics equipment to display and produce diagrams. The graphics workstation basically consists of the alphanumeric display terminal, a special version of the Lineprocessor, and a Tektronix storage tube display.

### ABOUT THIS DOCUMENT

This document is a description of how to use the graphics workstation and the graphics command language to add illustrations to a file, and how to print the diagrams either separately or combined with the text of the NLS file. In addition to serving as a hardcopy reference guide for users of Graphics, it may be used as the text for the Graphics course offered by the User Services group.

A Graphics system, because it is primarily visual, is more complex to write about and read about than it is to use. You do not have to completely understand this document to learn to use Graphics productively. The TERMINOLOGY section <4> and USING THE GRAPHICS SUBSYSTEM section <5> are each ordered in the sequence in which you would build your knowledge of Graphics. Gaining experience by practicing your repertoire of Graphics commands at any stage before studying new material is strongly recommended. You can accomplish productive graphics work with the level of capabilities covered in TERMINOLOGY through section <4h> and in USING THE GRAPHICS SUBSYSTEM through section <5j9>, and then study the subsequent commands much later as you gain expertise.

This document is written for users at course level III. We assume you are familiar enough with the Lineprocessor and DNLS to know how to move around within NLS files in DNLS and to BUG specific locations in those files. Our conventions for representing command syntax are similar to those used in the DNLS course (also outlined in the NLS Command Summary--24831.).

Since Graphics is a special experimental subsystem still undergoing development, mostly in response to users' experiences, there may be a few minor changes after this version of the Graphics Users' Guide is published. Changes affecting your use of Graphics will be announced periodically and will be reflected in Help (to read specific notes about changes, you may type: Help Graphics REVISIONS OK); we suggest you note these corrections in your copy of this Users' Guide. Also report your suggestions about Graphics to FEEDBACK.



## USING THE TEKTRONIX EQUIPMENT WITH DNLS FOR GRAPHICS

2

### Display of NLS files on the Graphics Workstation

2a

Diagrams can be associated with any NLS statement in a file. The text of the statement is displayed on the alphanumeric screen, and the diagram is displayed on the Tektronix screen. When you create a diagram at a statement, NLS adds the text "(see attached diagram)" to the statement, seen on the alphanumeric screen.

2a1

You create, display, and edit diagrams with commands in the Graphics subsystem in NLS 8.5. You give commands in Graphics as you do in any other subsystem (e.g., Base, Sendmail) in DNLS. The command specifications are displayed on the alphanumeric screen. The keyboard for either the alphanumeric or Tektronix terminal and the mouse are used for this interaction. Commands to start up Graphics are described below in the ENTERING THE GRAPHICS SUBSYSTEM section <3>.

2a2

### The Tektronix storage tube display

2b

In order to display diagrams with the Graphics subsystem, the Tektronix model 4014 or 4012 display must be connected to the Lineprocessor/alphanumeric terminal workstation via the Copy Printer port on a Lineprocessor specially configured for graphics use - a "Graphics Lineprocessor". The Tektronix's LINE/LOCAL switch must be set to LINE. See APPENDIX 1 of this guide (section--7) for further notes on the installation of the Tektronix units.

2b1

The Tektronix display must warm up for several minutes before use. As soon as you switch ON the power a bright green spot or pattern will appear on the Tektronix screen. Use the PAGE RESET key at the upper left hand corner of the Tektronix keyboard to clear the screen. Do this several times as the machine warms up.

2b2

While the Tektronix display is ON, it is in one of three modes:

2b3

#### CLEARED mode - no diagram display

2b3a

Before you call for any diagram to be displayed, there is nothing written on the Tektronix screen, although there may be spots of brightness. When you hit the PAGE RESET key, the screen remains in CLEARED mode (and the spots should dim). Once you display diagrams on the screen, hitting PAGE RESET will put the display back in CLEARED mode.

#### VIEW mode - bright diagram display

2b3b

When you create a new diagram or portray an existing one on the screen, a bright green image of the picture is written on the storage tube screen. When you are not actively working on the diagram, the image will remain bright for only 30 to 60 seconds. From VIEW mode, the display goes into HOLD mode. If you are interrupted during a command that manipulates the diagram, the screen may remain in VIEW mode indefinitely. This diminishes the rather limited life of the storage tube. Don't remain in VIEW mode for more than 15 minutes--do a Command Delete.

#### HOLD mode - dim diagram display

2b3c

The bright image on the screen will dim, though you can still perceive the lines, after a short while in VIEW mode. To get back in VIEW mode, hit the SHIFT key on the Tektronix keyboard, or move the cursor on the Tektronix screen. The HOLD mode consumes somewhat less of the tube-life. Don't remain in HOLD mode for



more than 60 minutes. Move the cursor back to the DNLS screen (described below) and press PAGE RESET to clear the screen before leaving the workstation. When you return, you'll have to portray the diagram again.

#### The DNLS cursor and the foot switch

2c

Graphic entities are manipulated on the Tektronix screen as they are on the alphanumeric screen, by BUGGING. Pressing the foot switch switches cursor movement back and forth between the alphanumeric and Tektronix screens. The foot switch is connected to the back of the Lineprocessor.

2c1

To change the Tektronix from HOLD mode to CLEARED mode, move the cursor back to the alphanumeric display with the foot switch and hit PAGE RESET.

2c2

#### The Tektronix hard-copy unit

2d

When the Tektronix copier is attached to the Tektronix display terminal and powered ON, whatever is on the Tektronix screen (in VIEW mode) can be copied by pressing the copy button on the hard-copy unit or on the Tektronix display's keyboard. The copier has to warm up for nearly 30 minutes before it makes uniform copies. If unsatisfactory copies appear after 30 minutes of power, adjust the contrast knob on the front of the copier. If the copies are still unsatisfactory, additional adjustments by an expert may be necessary.

2d1

During copier operation the Tektronix display is not available to NLS for any operation. You must wait until you hear the paper cutter in the copier make a firm click before entering any command which will change the display on the Tektronix.

2d2

Entering the Graphics Subsystem

# ENTERING THE GRAPHICS SUBSYSTEM

3

After logging into TENEX, specify that your terminal type is a Lineprocessor, and call NLS:

3o

@TERMINAL (type is) LINEPROCESSOR CR

@NLS CR

3o1

Graphics is a subsystem of DNLS which you can load anytime with the Load Program command in the Programs subsystem. It is a very large subsystem, so first delete any other programs you have loaded in your programs buffer space:

3b

Execute (command in) Programs Delete All (programs in buffer) OK

Execute (command in) Programs Load Program GRAPHICS OK

3b1

After you see "Subsystem GRAPHICS Now Available (Attached)" flash by in the TTY window, you may "Goto" Graphics anytime from any NLS subsystem:

3c

Goto (subsystem) Graphics OK

3c1

Your herald is now GRAPHICS. The commands described below in USING THE GRAPHICS SUBSYSTEM, section <5>, are now available to you, along with the Universal commands such as Jump, Execute, Goto, Quit, Help, etc.

3d

Use the Jump commands to move around in NLS files in order to display the statements containing diagrams on the alphanumeric screen.

3e

If you want to use some of the editing commands in BASE to make changes to the text of the loaded file, use the Goto Base command, do your editing, and then give the Quit command to return to Graphics. A portrayed diagram will remain on the screen in Hold mode (but be sure to foot-switch your cursor back to the alphanumeric screen).

3f

To leave Graphics and erase your screen, command:

3g

Quit OK

3g1

Once you Quit from Graphics, you must Goto Graphics again (although during this NLS session you needn't Load Program again) in order to portray a diagram.

3h

## TERMINOLOGY

4

Definitions of some terms and concepts specific to Graphics are listed here for your reference. To get started in Graphics, we suggest that you turn to the next section, USING THE GRAPHICS SUBSYSTEM (5), and work through it in sequence, turning back to this section for a basic explanation of new terms.

4a

**Diagram:**

"Diagram" refers to an entire graphics picture that is associated with a single NLS statement. It may consist of any number of figures and labels.

4b

**FIGURE:**

"FIGURE" is the general term that stands for any graphics entity. Each may be referred to specifically, such as by Circle, Triangle, etc., or by the general command word Figure. FIGURE is used in a Delete, Move, Copy or Show command. When you see "FIGURE" in a command syntax description, type one of the following as a command word:

4c

Point  
Line  
Rectangle  
Diamond  
Triangle  
Circle  
Arrowhead  
Statement:

In Graphics, "Statement" refers to a string of text which is in the diagram itself, such as a phrase labelling a box in a flowchart, having been inserted with the Label or the Insert Statement command in Graphics.

**Figure:**

This is a general command word used to refer to any of the preceding entities.

**LINEWORK:**

"LINEWORK" is a general term that stands for any graphics entity except a Statement. When you see "LINEWORK" in a command syntax description, type one of the following as a command word:

4d

Point, Line, Rectangle, Circle, Diamond, Triangle, Arrowhead, or Figure

**Attaching Point:**

The "attaching point" of a figure is its leftmost visible point; if there is more than one leftmost point, the uppermost one is the attaching point. You specify which figure you want (i.e., in a move or delete command) by BUGGING its attaching point.

4e

**Reference Point:**

The "reference point" of a figure is used when moving or copying a figure or group of figures. You can choose any point on the figure as your reference point when a command prompts you. Then you specify where the reference point will lie in the new location.

4f

**Group:**

A "group" of figures is all those figures whose attaching points fall within a particular rectangular area. In the commands involving groups, you are asked to define the upper right and lower left corner of a rectangle which includes some attaching points. A group only remains defined for a single command and thus with each new command, you can select a new group.

4g



## Terminology

### Grid, and "Bugging" on the Tektronix:

A "grid" can be thought of as an imaginary piece of graph paper superimposing points on your diagram. These grid points are used to draw figures. Your cursor appears as a small lighted square which tracks around on the Tektronix screen as you move the mouse. When you give a BUG, a small dot appears where the lower left corner of the cursor was caught at that moment, and the nearest grid point to that point will be taken as the location defined. You can have the grid drawn as dots on sections of your screen. These dots are not actually part of your diagram and will disappear when you refresh or re-portray it. You can change the distance between the grid points when some other interval is more helpful for drawing.

4h

### Page Space:

"Page space" is the large storage area in which you "draw" the figures making up the diagram. You will probably view only a small portion of this area while working with a diagram. When you first create a diagram, a portion of the total page space will appear on the graphics screen enclosed in lines designating margins. The Tektronix screen is a "window" you can move around within your total page space. You can also vary the magnification of your view. Your view (and drawing) is not limited to the area within the margins, and each margin can be moved within page space. The Tektronix copier prints whatever is currently on the Tektronix screen, e.g., in the "window", including any visible margin lines.

4i

### Margins:

When you create a diagram, you automatically get part of your entire page space enclosed in margins. You can move the margins to enclose a different section with the Set Margin commands; this may also change the size of the enclosed portion of the diagram (called Page Size when you Show Drawspecs). You can also make the margin lines invisible so they won't appear when you use the copier.

4j

### Photocomposition:

Diagrams, either by themselves or intermixed with the regular text of the NLS file, can be output to photocomposition equipment, i.e., encoded on a magnetic tape which the photocomposer converts to microfilm or to photo-offset masters for printing. When you send a file with a diagram to a photocomposer, what is enclosed in the margins is the portion of the diagram that will be printed. The lines designating the margins on the screen will NOT be printed.

4k

### Zooming:

"Zooming" is changing the magnification of your view of your diagram. You may see part of the diagram in more detail--and thus can see less of the page space, or you may see more of the page space by showing less detail. In addition to changing the apparent sizes of figures in your window by zooming in or out, you may also use Zoom commands to focus on some other position in page space. These activities do not permanently affect the diagram. Use of the Set Margin and Zoom commands may expose sizable sections of page space outside the current margins, which are useful as a "scratch pad", to store templates for instance.

4l

### Split Screens:

Use edges in Graphics as you do in Base to set up additional windows on your Tektronix screen. Then, each window may be used to view part of a diagram. You will be able to simultaneously view different diagrams, or sections of a diagram in different magnifications.

4m

## USING THE GRAPHICS SUBSYSTEM

5

Create Diagram (at statement) DESTINATION OK

5a

This command associates a blank diagram with the statement in the NLS file you indicate for DESTINATION (DESTINATION = BUG or ADDRESS). The blank diagram (showing the margins only) will be portrayed in the window on your Tektronix screen. The text "(see attached diagram)" will automatically be written at the end of the statement you specified. This text is for your convenience in locating a diagram; you may modify it as you choose like any other text in a statement--Graphics will "remember" that the diagram is attached.

5a1

Portray (diagram at statement) DESTINATION (in graphics window) BUG

5b

This command allows you to see the diagram that is associated with a statement in an NLS file at the DESTINATION you specify, whether it is blank or has figures drawn in it. It will appear in the graphics window you BUG when prompted by B: (To BUG in the Tektronix window, first press the foot switch if the cursor isn't moving on the Tektronix screen when you move the mouse; then hit OK). If there is another diagram in the window, that one will be erased before the new one is portrayed.

5b1

You may stop this process at any point by typing a <CTRL-O>. You may then manipulate any figure that appears in the incomplete diagram.

5b2

### INSERTING LINEWORK--DRAWING:

5c

Line drawings are created or added to the diagram with the following Insert commands. The commands prompt for the data they need to draw the figure.

5c1

(B) Lines:

5c2

Insert Horizontal (line starting at) BUG (ending) BUG OK

5c2a

This command draws a horizontal line. The line begins at the grid point nearest the point you BUG when prompted by the first B:. The second B: prompts you to BUG a point through which an imaginary vertical line is determined. The inserted horizontal line ends at a point on that imaginary line. In other words, your second bug may be a little above or below the horizontal but the system will always draw a horizontal line.

Insert Vertical (line starting at) BUG (ending) BUG OK

5c2b

This command draws a vertical line. The line begins at the grid point nearest the point you BUG when prompted by the first B:. The second B: prompts you to BUG a point through which an imaginary horizontal line is determined. The inserted vertical line ends at a point on that imaginary line. In other words, the system will see to it that your line is vertical.

Insert BUG (and) BUG OK

5c2c

This command draws either a horizontal line or a vertical line depending on the points you BUG. Approximate the end point of a horizontal or vertical line with your second BUG.

The line begins at the point you BUG when prompted by the first B: (resolved to the nearest grid point). The system determines imaginary horizontal and vertical lines through the second point you BUG (nearest grid point). The inserted (horizontal or vertical) line will end at a point on either of those imaginary lines, whichever is farther away.



Using the Graphics Subsystem

Insert Line (between) BUG (and) BUG OK

5c2d

This command allows you to draw a line between any two points you BUG (resolved to the nearest grid point). It is most useful for drawing lines that are not horizontal or vertical, though it may be used for those also.

(C) Arrowheads:

5c3

The Graphics command "Insert Arrowhead" draws an arrow tip pointing in the direction you specify with one of the alternatives below. B: prompts you to BUG the point where you want the tip of your arrowhead. An arrowhead is often drawn at the end point of a line to form an arrow.

5c3a

Insert Arrowhead (pointing) Down (at) BUG OK

Insert Arrowhead (pointing) Up (at) BUG OK

Insert Arrowhead (pointing) Left (at) BUG OK

Insert Arrowhead (pointing) Right (at) BUG OK

Your arrowhead gets a default size. See the SIZE AND TYPE SETTINGS section (5j).

(D) Circles:

5c4

Insert Circle (center) BUG BUG OK

5c4a

This command draws a circle with the center at the point you specify with the first BUG, and which passes through the point you specify with the second BUG. Thus, the two points form the circle's radius.

Insert Circle (center) BUG Horizontally (tangent to) BUG OK

Insert Circle (center) BUG Vertically (tangent to) BUG OK

5c4b

The first BUG specifies the center of the circle. The command word "Horizontally" or "Vertically" plus the subsequent BUG define an imaginary line. Your circle will be drawn tangent to (resting against) that line.

(E) Rectangles and Squares:

5c5

Insert Rectangle (corner at) BUG (opposite at) BUG OK

5c5a

This command draws a rectangle. The first B: prompts you to BUG the point you want for one of the corners. The second B: prompts you to BUG the point you want for the rectangle's diagonally opposite corner.

Insert Square (upper left corner at) BUG (size) BUG OK

5c5b

This command draws a square. The upper left corner will be the point you specify with the first BUG. Approximate one of the other three corners with the second BUG.

The system enables this approximation by determining imaginary horizontal and vertical lines through the second point bugged. One side of the square will be drawn, horizontally or vertically, from the upper left point to a point on either of those lines, whichever is farther away. The other equal sides of the square are determined from this first side.

Refer to the square as a "Rectangle" or a "Figure" when you wish to Copy, Move, or Delete it (described below).

## (F) Triangles:

5c6

"Insert Triangle" draws a triangle with the vertex pointing in the direction you specify according to one of the commands below. The first B: prompts you to BUG the vertex (called "top" in the command) of the triangle and the second B: prompts you to BUG one base point of the triangle. An isosceles triangle will then be drawn.

5c6a

Insert Triangle (pointing) Down (top) BUG (one base point at) BUG OK

Insert Triangle (pointing) Up (top) BUG (one base point at) BUG OK

Insert Triangle (pointing) Left (top) BUG (one base point at) BUG OK

Insert Triangle (pointing) Right (top) BUG (one base point at) BUG OK

## (G) Diamonds:

5c7

Insert Diamond (top at) BUG (bottom at) BUG (side at) BUG OK

5c7a

This command draws a diamond. The first B: prompts you to BUG where you want the top point. The second B: prompts you to BUG a point through which an imaginary horizontal line is drawn. The bottom point of the diamond will pass through this line. The third B: prompts you to BUG a point through which an imaginary vertical line is determined. One side point of the diamond will pass through this line. The other side will be symmetrical.

5c7b

## (H) Point:

5c8

Insert Point (at) BUG OK

5c8a

This command marks a dot at the nearest grid point to where you BUG. This point is part of your diagram.

5c8b

Text is added to the diagram using the following commands:

5d

Insert Statement (into the window at) BUG (and) BUG CONTENT OK

5d1

This command allows you to type text to be inserted into your diagram. You indicate the imaginary rectangle you want your text enclosed in by bugging the upper left corner when prompted by the first B: and bugging the lower right corner when prompted by the second B:. Then type in the text. Your text will be justified within the "rectangle" according to the justification currently set. You start out with left justification; see section <5j7>. The text will wrap around to subsequent lines (broken between words if possible) if your rectangle isn't wide enough and if there is room for more lines. Text which cannot fit within the rectangle will be truncated.

5d1a

This text can subsequently be referred to as a Statement or a Figure; its attaching point is the leftmost upper character. Base commands that search for content will NOT find text that's part of a diagram.

5d1b

Label (diagram at) BUG (with) CONTENT OK

5d2

This command allows you to type text to be inserted into your diagram. The text you give when prompted for CONTENT will be written on the graphics screen, justified to the point you bug, according to the justification currently set. You start out with left justification; see section <5j7>. Text inserted with the Label command will not be truncated or wrapped around (unless you include a carriage return).

5d2a

The inserted text is subsequently referred to as a Statement or a Figure; its attaching point is the left edge of the upper leftmost character.

5d2b



# Using the Graphics Subsystem

## Seeing the Grid

5e

A grid is used to control the placing of points when drawing or editing figures. Displaying your grid in sections of the graphics window will show you the exact points you can bug. That is, you will notice that a point appears where the lower left hand corner of your cursor was when you gave the BUG; figures will be drawn in relation to the nearest grid point to that spot.

5e1

Show Grid (in the window) BUG (other corner) BUG OK  
 . (Show Grid in the window) BUG (other corner) BUG OK

5e2

The first B: prompts you to BUG the upper left corner of the rectangle where you want the grid to be shown; the second B: prompts you to BUG the lower right corner of this rectangle. The grid points will be drawn. These points are not part of your diagram and will not continue to appear on the screen when it is re-created, nor be part of the diagram when output to COM. Typing a period as your first command word will do the same as "Show Grid".

5e2a

Displaying the dots can be a long process if you're filling a large area. You can type a <CTRL-O> at any time to stop it. Better yet, fill only small areas.

5e2b

To work with a smaller or larger grid, see the command at <5j3b>.

5e3

## EDITING LINEWORK AND TEXT: Copy, Move, and Delete

5f

These editing commands allow you to copy, delete, or move any particular graphics entity--a Statement, Rectangle, Point, Line, Triangle, Diamond, Circle, Arrowhead, or Figure (the general term for one of these); this set of choices is referred to as "FIGURE".

5f1

Delete FIGURE (at) BUG OK

5f1a

This command deletes the FIGURE whose attaching point you BUG when prompted by B:. An X will be drawn on the attaching point of the figure that is deleted. The deleted figure will remain on the screen until it is re-created.

Copy FIGURE (at) BUG (from) BUG (to) BUG OK

5f1b

This command makes a second copy of the FIGURE. The first B: prompts you to BUG the figure's attaching point. The second B: prompts you to BUG a reference point, and the third B: prompts you to BUG a point where you want the reference point to be in the new figure.

Move FIGURE (at) BUG (from) BUG (to) BUG OK

5f1c

This command moves the FIGURE to a different location. The first B: prompts you to BUG the figure's attaching point. The second B: prompts you to BUG a reference point and the third B: prompts you to BUG a point where you want the reference point to be when the figure is moved. The figure will appear at the new location, and an X will be drawn on the attaching point of the FIGURE in the old location. The old figure and the X will remain on the screen until it is re-created.

## Editing groups of entities:

5f2

A Group is a collection of any figures whose attaching points lie in a bounding rectangle you specify. COPY, MOVE, and DELETE work for Groups.

5f2a

Delete Group (of figures in the window at) BUG (and) BUG OK

Copy Group (of figures in the window at) BUG (and) BUG (from) BUG (to) BUG OK

Move Group (of figures in the window at) BUG (and) BUG (from) BUG (to) BUG OK

## Using the Graphics Subsystem

You define the Group with an imaginary rectangular area which encloses the attaching points of all the figures you want to copy, move, or delete. In these commands, the first B: prompts you to BUG the upper left corner of the rectangle and the second B: prompts you to BUG the lower right hand corner.

5f2b

The third and fourth BUGs in the Copy and Move commands specify the reference points of the old and new locations.

5f2c

X's will be drawn on the attaching points of all figures deleted or moved.

5f2d

Re-creating the screen to show the changes to the diagram:

5g

Update (graphics display) OK

5g1

This command rewrites the screen with all the changes you have made to your diagram since the last update. Use this command after you have used the Move, Delete, Change, and Show Grid commands to make changes and really need to see a fresh display; it takes time to re-create complex diagrams. <CTRL-O> can be used to stop the rewrite before it is completed (you will be able to manipulate only completely rewritten figures).

5g2

The Graphics Update command merely re-creates the display so you can clearly see your changes to the diagram. Changes to a diagram are treated as modifications to the file just like other edits of NLS files with Base commands. The Graphics Update command does not merge the modifications into another version of the NLS file; execute the Update File command in BASE to update the file, i.e., to make the re-created changes permanently part of the file.

5g3

Additional commands manipulating Lines:

5h

Attach (from the last line to) BUG OK

5h1

This command creates a new horizontal or vertical line starting from the end point of the last line created (even if that line has been deleted). The BUG you give in this command determines the end point of the new line: imaginary horizontal and vertical lines are drawn through the bugged point. The inserted (horizontal or vertical) line will end at a point on either of those imaginary lines, whichever is farther away. The new line is a separate entity with its own attaching point. Do not confuse this command with the Xtend command.

5h1a

An example of the usefulness of this command is in drawing the lines defining the structure of organizational charts. You may draw a line at ninety degrees from the previous line, without having to precisely BUG the corner point.

5h1b

Xtend Visibly (the line at) BUG (to) BUG OK

Xtend Invisibly (the line at) BUG (to) BUG OK

5h2

The Xtend command allows you to continue the line whose attaching point you BUG when prompted by the first B:, to the end point you specify when prompted by the second B:. If you use the command word "Visibly" rather than "Invisibly", the line will be redrawn to include both segments. If you Xtend Invisibly, the new segment you specify will not be visible. You could then Xtend the line again, Visibly, and the new segment would start at the end point of the invisible segment. Your extended line may turn corners. The original line and any extended segments are a single line with one attaching point. Your attaching point changes if you visibly extend a line further left of, or exactly above, your original attaching point. Note the difference from the Attach command.

5h2a



# Using the Graphics Subsystem

Backspace (the line at) BUG OK

5h3

The Backspace command allows you to delete the last line segment that you added to any line using the Xtend command. BUG the attaching point of the line (i.e., upper leftmost visible point of the WHOLE FIGURE you created from the original line). You can repeat the Backspace command to delete each of the line segments, visible or invisible, that you have added except for your original line. Use the Delete Line command for your original line; it will delete any extended segments as well as the original line.

5h3a

Editing whole diagrams:

5i

To delete, move, or copy whole diagrams (which may contain many figures), you must use the Delete, Move, or Copy Statement command in the BASE subsystem, and then change the text of the statement if necessary.

5i1

## SIZE AND TYPE SETTINGS:

5j

"Drawspecs" refers to the size and type characteristics of figures, including text. These include the size of the grid, arrowheads, characters, and the line style and type, the character style and font, the placing of your margins, and the kind of justification for text.

5j1

Displaying the Drawspecs settings for creation of figures:

5j2

Show Drawspecs OK

5j2a

This command shows the Drawspecs which are currently determining the characteristics of figures to be inserted. The page size for the currently portrayed diagram is also included in this information. In response to this command, the following would be displayed on your alphanumeric screen if you have just created a diagram and have not yet used any Set commands. After you use a Set command to change Drawspec settings, those changes will be reflected in this command. Page size will change when you change the margins for the diagram portrayed (with Set Margin commands).

5j2b

```

grid .1 in [in = inches]
resolution 1000 increments per inch
page size 8.5 in by 11 in [the number of inches between the
                           margins for the portrayed diagram]
character height .166 in width .119 in (12 pt)
left justification
TimesRoman font
Medium boldness
- Straight
- Not underlined
- Proportional spacing
line type solid
line style regular
arrowhead height .111 in width .082 in
    
```



## Controlling size settings of grid, arrowhead and characters:

5j3

The Drawspecs listed above, which control what size or type new figures will be, are the defaults. If you want the grid and new text and arrowheads you insert to be other sizes, use the following Set commands.

5j3a

## Set Grid (size) CONTENT

5j3b

(CONTENT stands for either a BUG, TYPEIN, or OPTIONAL ADDRESS of the new size.)

This command allows you to change the size of the grid used to place figures during the current Graphics session. When you Goto Graphics, your grid size is .1 inch, which means there is a grid point every tenth of an inch; your BUGs will be resolved to the nearest one. If you are not precisely measuring the locations of figures, .1 inch may be sufficiently close and you may never need to examine your grid. However, when trying to bug grid points exactly, you may find it is fatiguing to distinguish between points so close together, so try .2 or .25 inches.

You may also set your grid size in terms of point size or English or metric measures (abbreviations of terms listed at--5j3e). You may not set your grid size to smaller than .001 inches. Use the Show Grid or "." (period) command to see a portion of the grid you are using.

## Set Arrowhead (height) CONTENT (width) CONTENT

5j3c

This command allows you to specify what size new arrowheads you insert will be, during this session of Graphics (a Graphics session starts when you give the command Goto Graphics). The default size is 8 points high and 6 points wide (shown in Drawspecs as .111 inch high and .082 inch wide). You may set your arrowhead size in terms of point size or English or metric measures (abbreviations listed at--5j3e).

## Set Character (height) CONTENT

5j3d

This command allows you to specify the height of the characters you subsequently insert into your diagrams as Statements and Labels. The size, for each Graphics session until you change it with this command, is defaulted to 12 point type (shown in Drawspecs as .166 inch high and .119 inch wide). You may specify a number for the height which will be taken as inches, a number followed by pt, which will be point size, or a number followed by a metric measure abbreviation (these are listed below). You may not specify anything smaller than .001 inches. For a particular height you specify, the proper corresponding width will be set; you cannot set the width, although you can show it with the Show Drawspecs command.

The system remembers the precise size of characters that is specified for the photocomposer. See the diagram illustrating various character sizes at <6b>. Display of these characters on the Tektronix is handled in the following way. For each character to be output to the screen, an invisible box is set up, with the height and width corresponding to the character size. The Tektronix 4014 can only display in each box a character of the closest approximate size of its 4 character sizes. The Tektronix 4012 can display only one character size. In either case, the distance from one character to another (the size of the character box) will be more predictive of the character height and width which the photocomposer will correctly print. Of course, the Tektronix Copier will output exactly what is on the screen.

Using the Graphics Subsystem

Measurement abbreviations:

5j3e

The size of the grid and other entities such as characters and arrowheads can be expressed in inches, meters, points, etc. The abbreviations below are appended to a number to describe the size.

English measures

in (or no abbreviation) = inches  
ft = feet  
yd = yards  
mi = miles

Metric measures

mm = millimeters  
cm = centimeters  
dm = decimeters  
m = meters

Point measures

pt = points (0.013837 inches)

Examples: 3.75 (3.75 inches)  
2mm (2 millimeters)  
10 pt (10 points)

Changing & displaying the Drawspecs for an individual figure:

5j4

Once a figure or text is inserted into the diagram, the Drawspec information used to specify how it was drawn is stored in the file with it. To change those specifications, and the figure itself, use the Change commands. For example, to change the sizes of characters in an already inserted statement:

5j4a

Change Character (height to) CONTENT (for statement at) BUG OK

The statement with the new character size will be printed on top of the original one (which will be crossed out with an X) on the screen, and the latter will disappear when the screen is refreshed. This command does not affect the Drawspec settings for new statements, but rather changes the setting and the actual appearance of a single statement; the Set Character height command does the former. Note that whether text has been inserted into the diagram with the Insert Statement or with the Label command, it is referred to as a Statement (or Figure) in commands which manipulate text.

Show Specific (drawspecs for) FIGURE (at) BUG OK

5j4b

Use this command to see the Drawspecs that were used to draw any particular figure already in the diagram. The third command word is the name of any FIGURE, such as Circle, Rectangle, Statement, Figure, etc. Then BUG the attaching point of the figure. Do not confuse this command with the Show Drawspecs command.

If you want to change the characteristics of the figure, use a Change command, such as the Change Character height command described above, or others to be described below.



## Using the Graphics Subsystem

## Character fonts:

5j5

Set Font FONT OK

5j5a

This command allows you to specify the type face of the statements to be subsequently inserted into your diagrams during this Graphics session (with the Label or Insert Statement command). The initial setting is Times Roman. Others are listed below at <5j5c>, and some commonly used fonts are illustrated in the diagram at <6b>. The Tektronix can display but one font, Courier, so you will not be able to examine the results of using different fonts until the diagram is output to COM. However, the Show Specific drawspecs command will display the name of the font for a particular statement that is already part of the diagram.

Change Font (to) FONT (for statement at) BUG OK

5j5b

Use this command to change the character font of a statement already contained in the diagram.

FONT = one of the following command words:

5j5c

Timesroman, Newsgothic, Courier, Film, Directory,  
Ocrb (Optical Character Recognition font B), or  
Nmamicrofont (National Microfilm Association microfont)

## Character style and emphasis:

5j6

You may choose that the text of statements be proportional or monospaced, underlined or not, slanted or not, and choose the degree of boldness. The Set Emphasis command determines these characteristics for statements to be subsequently inserted; the Change command affects these characteristics for statements already in a diagram. The Tektronix cannot display the differences in these characteristics; you will see the results in COM only (they are illustrated in the diagram of character sizes and styles at--6b). Note that there are four two- or three-way switches controlled by each command; repeat the command to set another of the four characteristics. At each Graphics session, emphasis is initially set to Medium boldness, Proportional spacing, Straight, and Not underlined for new figures.

5j6a

Set Emphasis TEXTSTYLE OK

5j6b

Change Emphasis (to) TEXTSTYLE (for statement at) BUG OK

5j6c

TEXTSTYLE = one of the following command words:

5j6d

|        |                        |          |                  |
|--------|------------------------|----------|------------------|
| Light  | Proportional (spacing) | Straight | Not (underlined) |
| Medium | Monospaced             | Slanted  | Underlined       |
| Bold   |                        |          |                  |

## Justification for Graphics text:

5j7

The Set Justification commands allow you to set the justification--left or center or right--of statements to be subsequently inserted into your diagrams. Left justification is the initial setting. The Change Justification commands are used to justify a particular statement to a different position; the statement is actually moved. The three positions are illustrated in the diagram at <6b>.

5j7a

Set Justification Center OK

Set Justification Right OK

Set Justification Left OK

Change Justification (to) Center (for statement at) BUG OK

Change Justification (to) Right (for statement at) BUG OK

Change Justification (to) Left (for statement at) BUG OK

Using the Graphics Subsystem

Line style and type:

5j8

The lines that make up rectangles, triangles, and the other LINEWORK (see--4d) are also affected by these commands. These differences are visible on the screen of the Tektronix model 4014, but are not visible on the screen of model 4012. (See illustration diagram at--6c)

5j8a

For lines to be inserted:

5j8b

Set Line Style (to) Very (bold) OK  
 Set Line Style (to) Bold OK  
 Set Line Style (to) Regular OK [default setting]  
 Set Line Style (to) Fine OK  
 Set Line Style (to) Extra (fine) OK  
  
 Set Line Type (to) Solid OK [default setting]  
 Set Line Type (to) Dotted OK  
 Set Line Type (to) Long-dashed OK  
 Set Line Type (to) Short-dashed OK  
 Set Line Type (to) Dot-dashed OK

For individual lines already in the diagram

5j8c

Change Line Style (to) Very (bold for) LINEWORK (at) BUG OK  
 Change Line Style (to) Bold (for) LINEWORK (at) BUG OK  
 Change Line Style (to) Regular (for) LINEWORK (at) BUG OK  
 Change Line Style (to) Fine (for) LINEWORK (at) BUG OK  
 Change Line Style (to) Extra (fine for) LINEWORK (at) BUG OK  
  
 Change Line Type (to) Solid (for) LINEWORK (at) BUG OK  
 Change Line Type (to) Dotted (for) LINEWORK (at) BUG OK  
 Change Line Type (to) Long-dashed (for) LINEWORK (at) BUG OK  
 Change Line Type (to) Short-dashed (for) LINEWORK (at) BUG OK  
 Change Line Type (to) Dot-dashed (for) LINEWORK (at) BUG OK

Reset Drawspecs OK

5j9

This command changes all the Drawspecs for figures to be inserted--grid size, arrowhead size, character size, font, character emphasis, justification, and line style and type--back to the initial settings for a Graphics session. See the Show Drawspecs command for the default settings (5j2). The Reset Drawspecs command does not affect page size or figures already in a diagram.

5j9a



## Using the Graphics Subsystem

Read the concepts defined in the TERMINOLOGY section from <4i> through <4m> as an introduction to the Graphics capabilities described hereafter.

## Page size--changing margins:

5j10

Margins are characteristics of an individual diagram which stay with it until the next time you change the margins on that particular diagram. Margins for a newly created diagram enclose an 8.5 by 11 inch portion near the center of your page space. When you portray the diagram, a proportional representation of this area will nearly fill the window; two horizontal and two vertical lines represent the margins.

5j10a

Included in your window, with default margins, will be some space outside the vertical margins. You can draw outside the margins. You may also expose areas outside the margins by moving margins inward or by zooming for a different view of page space. Any drawings outside the current margins will not be output to COM, unless you move the margins outward to enclose them. The lines for the margins are not actually part of your diagram, and won't appear in a photocomposed version.

5j10b

A conceptual map of the relationship between page space and the viewing window can be found in the illustration of the Graphics viewing system below at <6a>.

The Set Margin commands listed below move the margins in the currently portrayed diagram. The new margin will stay with that diagram until the next time you set it. Moving the margins changes your page size, which you can examine with the Show Drawspects command. Page size will determine the proportions (aspect ratio) of the diagram on the page when it is printed via a photocomposer. You can see the dimensions of your current diagram with the Show Drawspects command (see--5j2).

5j10c

Set Margin Right BUG OK  
Set Margin Left BUG OK  
Set Margin Bottom BUG OK  
Set Margin Top BUG OK

In the above commands, B: prompts you to BUG a point through which the new margin will pass. A line representing the new margin will be drawn on the screen (if it isn't too close to the edge); the old line will disappear when the screen is recreated. The next time you portray this diagram, it may be a different size: Graphics will fill the screen with the figures between the new margins, keeping the proportions intact.

5j10d

## Special features for applications using the Tektronix Copier:

5k

## Making margins invisible for copying:

5k1

Set Margin Off OK  
Set Margin On OK

After you Set Margin Off, each time the screen is refreshed (such as with the Update, Portray, or Zoom commands in Graphics), all four margins will be invisible. This is useful for making a copy with the hardcopy unit (see Output of Diagrams, METHOD 1--5q1). While invisible, the locations of the margins are still in effect, such as for page size and for determining the portion of the diagram shown with the Portray command. Subsequently moving a margin with the commands Set



# Using the Graphics Subsystem

Margin Left, Top, etc., or using Set Margin On, will cause the four lines to become immediately visible again. Margins are On by default when you first Load and Goto Graphics.

5k1c

## Viewgraph mode:

5k2

Set Viewgraph (mode on/off) On OK

Set Viewgraph (mode on/off) Off OK

After you Set Viewgraph mode On, each time the screen is refreshed, all linework and text will be drawn over four times on the Tektronix screen, that is, everything except margin lines will appear thicker and darker. This is useful when a viewgraph is to be made directly from the Tektronix copier's output (see Output of Diagrams, METHOD 1--5q1). Characters that are quite small or very close together on the screen may be so thickly drawn that they will be indistinct. Viewgraph mode is Off by default when you first Load and Goto Graphics, i.e., the figures are normally out-lined only once.

5k2c

## Terminal type:

5l

When you start a Graphics session (with the Goto subsystem Graphics command), the system will assume the terminal type is Tektronix 4014. If you are working at the Tektronix model 4012 (a label on the front panel will so state) give the following command each time you Goto Graphics:

5l1

Set Terminal (type) T2 OK

5l1a

You need do nothing if you work at the 4014, but if you give that command by mistake, the following command will switch the terminal type back to Tektronix 4014 (T4):

5l2

Set Terminal (type) T4 OK

5l2a

## Zooming:

5m

The Zoom commands allow you to move around in the page space and to change the magnification (zoom). Zooming does not affect your page size (the location of the margins), only your view in your current window on the diagram. These are the Zoom commands:

5m1

Zoom (or move image) BUG (to) Center OK

5m1a

This command allows you to bug the point on the diagram you wish to be located at the center of your window. This does not change the magnification of your view, but changes the position of your view.

Zoom (or move image) BUG (to) BUG OK

5m1b

This command allows you to reposition any spot you BUG in the window to another spot you BUG. The size of all the figures will remain the same; their position on the screen changes.

Zoom (or move image) In OK

5m1c

This command allows you to get a more detailed look at part of your diagram. Each time you give the command, the visible figures are blown up to twice their current size. The central point of your window remains in the same position, but you may not be able to see all of the figures you were previously viewing.

Zoom (or move image) Out OK

5m1d

This command allows you to get a more global view of your diagram. Each time you give the command, all of the figures in the window are reduced in size by half and you have a view of a larger portion of the entire diagram. The center of what was in your window remains in the same position.

Zoom (or move image) To (window) BUG (one corner) BUG (other corner) BUG OK

5m1e

This command allows you to get a more detailed view of the part of your diagram that you specify. For the two B: prompts, BUG two opposite corners of an imaginary rectangle bounding that part. When you type OK, the rectangle you have defined will be enlarged to fill your window as much as possible in keeping with its proportions.

Zoom (or move image) Full (size of the margins) OK

5m1f

When you Zoom to Full, the screen will be filled so that your margins are as near as proportionally possible to the edges of the screen. Therefore, if you move your margins and Zoom to Full, a different amount of the diagram will be seen on your screen. This is the same view as you would get in response to the Portray command; and this command also has the same effect as the Update command. Zoom to Full is useful after having used some other Zoom commands.

Splitting the Tektronix screen for more windows:

5n

The Insert Edge command splits a window into two windows for simultaneously and independently viewing different diagrams, or different parts or magnifications of the same diagram. This command can be repeated for a third window, etc.

5n1

Insert Edge (perpendicular to) BUG OK

5n2

You are prompted to BUG one of the four edges of a current window (which is the whole screen if you haven't used the command previously). The window will be split into two windows at that point, the division being indicated by a double line (the whole screen will be recreated). The entire contents of the current window will be proportionally squeezed into the side of the division in which your cursor is located during the final OK (depending on proportions, you may see more of page space).

5n2a

The other window will be empty; it can be filled using the Portray command (note that Portray prompts for a BUG in the window to be filled--or changed).

5n2b

You can manipulate the contents of any of the new windows independently in the same manner as for the whole screen you've been using. Once you have two or more windows on the screen, commands will affect the contents of the window in which your cursor is located when you BUG, or when you give the final OK; for example, try Show Drawspecs and Create Diagram. Each window has four edges, so it can be further split either horizontally or vertically. You can also move or copy figures from window to window by BUGGING in those locations. Use Delete Edge to get rid of a window.

5n2c

Delete Edge (ot) BUG OK

5n3

Deleting an edge bounding two windows eliminates the contents of one of them from your screen. The contents of the window where your cursor is during the final OK will fill the new larger window (the whole screen will be recreated). This may not be the same image you had before you split it originally (use Zoom Full to get the originally portrayed image).

5n3a



Using the Graphics Subsystem

Suggestions for drawing variations of LINEWORK figures:

5o

Figures made up of straight lines:

5o1

Insert Line and then Xtend it. You can use discontinuous lines, with the command Xtend Invisibly, to make a whole figure. See the Xtend commands (section--5h2).

5o1o

Figures containing curved lines:

5o2

Zoom In a couple of times or Zoom To the section of the diagram in which you are going to draw the figure. You will then find that your grid points are farther apart. Set a smaller grid size. Use the Insert Line and the Xtend commands to trace the outline of your figure between grid points; in this way you can draw a series of straight lines which will look like curved lines when you return to normal magnification (Zoom Full).

5o2o

See the flowchart template illustration at <6d>

5o3

You can copy statement 6d from the online version of this file (Userguides, Graphics, 6d) and then use it as your own drawing template. Copy the figures into the flowchart you compose in the blank area. When the drawing is finished, move the right margin to the left of the template figures.

5o3o

Any sequential file in Sequential Plot Language (SPL) format can be input, creating a new diagram, by using the following Graphics command:

5p

Input (SPL diagram from file) CONTENT (block number) CONTENT (at statement) DESTINATION  
OK

5p1

## OUTPUT OF DIAGRAMS:

5q

METHOD 1: Push the button on the Tektronix copier. The current display on the Tektronix screen, including any margin lines showing, will be copied. This output can be duplicated.

5q1

METHOD 2: Use the Output Processor via Output commands in the Base Subsystem to photocompose the diagrams in an NLS file along with the NLS statements.

5q2

Current page size for the diagrams in the NLS file will determine their proportions on the page when the COM output is finally printed.

5q2a

An Output Processor directive which you include in the NLS file prepared for the photocomposer locates each diagram on the formatted page and allows you to control its actual dimensions:

5q2b

.DiaSID=sid,n,m;

[The Insert Diagram Directive]

Insert this directive in your NLS file where you want space set aside on the page for a particular diagram. Insert the SID (Statement Identifier) of the statement to which the diagram is attached in place of "sid" after the equals sign in the example above. Thus, you can locate this directive in a statement other than the one to which the diagram is actually attached. The diagram will actually be drawn at the point this directive is reached. No more than one DiaSID directive may appear in a statement.

"n" and "m" set the height of the diagram. For "n", give a measure in lines to set aside white space when a draft of the document is printed at a terminal or line printer (or type nothing between the two commas); For "m", insert a measure in inches to specify the height of the figure when the page is printed via a photocomposer.

Make sure that the measurement you give is not greater than the amount of space you have left on the page before the Bottom Margin is reached; if there is not room for the height you specify in the rest of this column (or page, if you have only one column), the diagram will be drawn in the next column; if there is not room in the next column blank pages will be output. Note that the Top Margin and Headers and Footers (i.e., everything above and below the Body itself) prevent printing an 11 inch high diagram. For a "full page diagram" with a standard header and footer, for example, try using the directive .DiaSID=0123,60,7.0; and experiment from there.

The DiaSID directive causes the diagram to be horizontally centered in the column or page (between BLM and BRM if there is only one column; level indenting is ignored), maintaining a width with the same proportions to the given height as those defined by the current page size. There are additional Output Processor directives allowing you to control borders and white space around the diagram. Work with an ARC Applications representative for advice on their use.

Using the Graphics Subsystem

We recommend that the figure caption of your diagram be ordinary text in your file, rather than a label in the diagram. In that case it will appear above or below the appropriate white space in a draft printed on a terminal or line printer, as well as above or below the actual diagram in photocomposed output. The example below shows a statement we have used for a full-page diagram, inserting it at the bottom of the page which contains the first textual reference to the diagram:

.DiaSID=0123,58,6.75; Figure 1: Caption .Center;.PBS;

When the DiaSID directive precedes the text for the caption as above, the caption will appear in photocomposed output underneath the diagram. The caption will appear above the diagram when the directive follows the figure caption, as in this example:

Figure 1: Caption .Center;.PBS;.DiaSID=0123,58,6.75;

Refer to the Output Processor Users' Guide (32812,) for instructions for making a COM file.

5q2c

Currently, files including graphic production must be output via the SINGER 6000 at george lithograph company. The current Output Com command prompts you for the type of device; type S for SINGER. We expect other vendors to support this feature. Contact ARC Applications for the current status.

The Proof subsystem can be loaded as a user program in NLS and used to view the layout of the text and diagrams on each page as it will be printed via the photocomposer. The Tektronix 4014 display must be used. Proof works on a photocomposed version of your file; instead of making a Com Test file, use the following command to make a COM file in the connected directory before using Proof.

5q2d

Output Com Singer File FILENAME.com OK

METHOD 3: If an individual diagram is to be photocomposed by itself the following Graphics command can be used. It places the diagram you specify with DESTINATION into the sequential file you specify with CONTENT. The area between the margins will be expanded or contracted, if necessary, to a page size of 8.5 by 11 inches on final output.

5q3

Output (diagram at) DESTINATION (to COM file) CONTENT



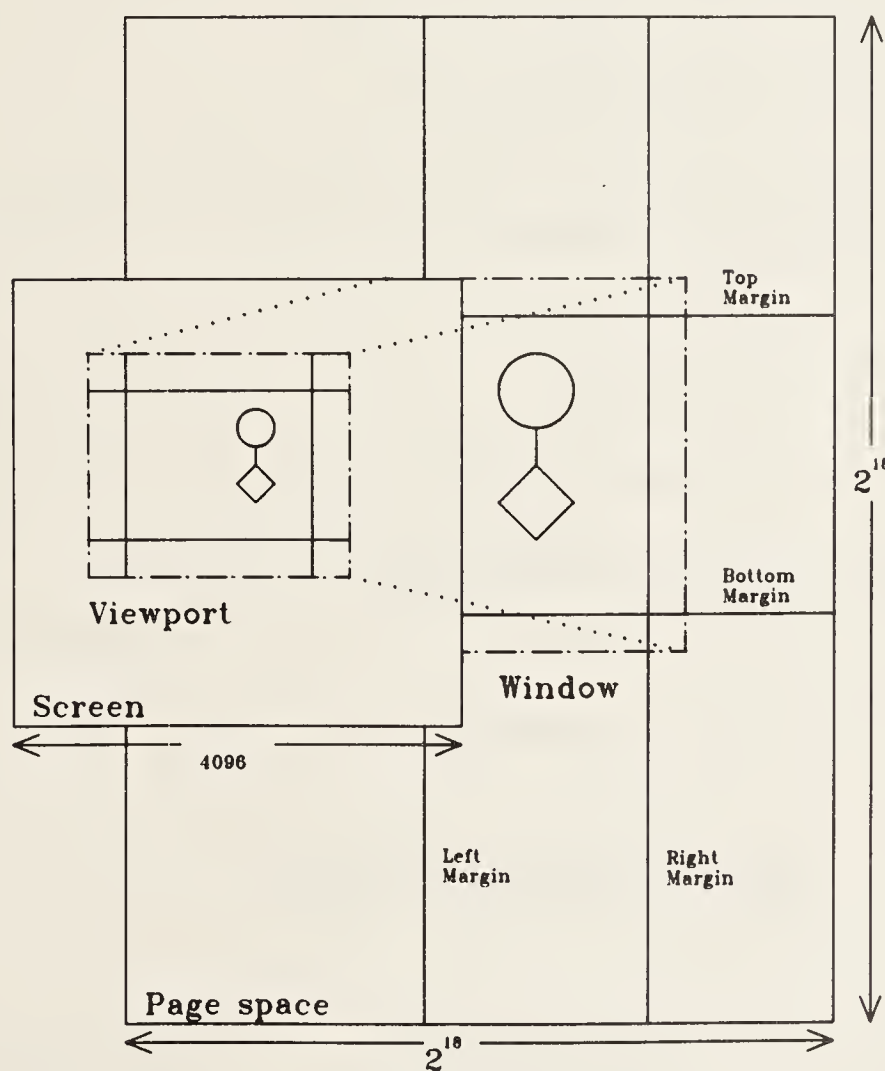
## ILLUSTRATION FIGURES

6

## NLS Graphics Viewing System:

6a

The relationship between the page space of the diagram as it is stored online and the viewing window on the Tektronix screen is mapped here in two planes. Some of the corresponding points between the screen and page space are connected with dotted lines (*see attached diagram*).



NLS Graphics Viewing System

6a1

Character Sizes and Styles, from george lithograph company (*see attached diagram*)

CHARACTER SIZES AND STYLES

Default Size and Font  
(12 point Times Roman)

- 10 point Times Roman light
- 10 point Times Roman medium
- 10 point Times Roman bold
- 10 point Times Roman monospaced
- 10 point Times Roman slanted and underlined

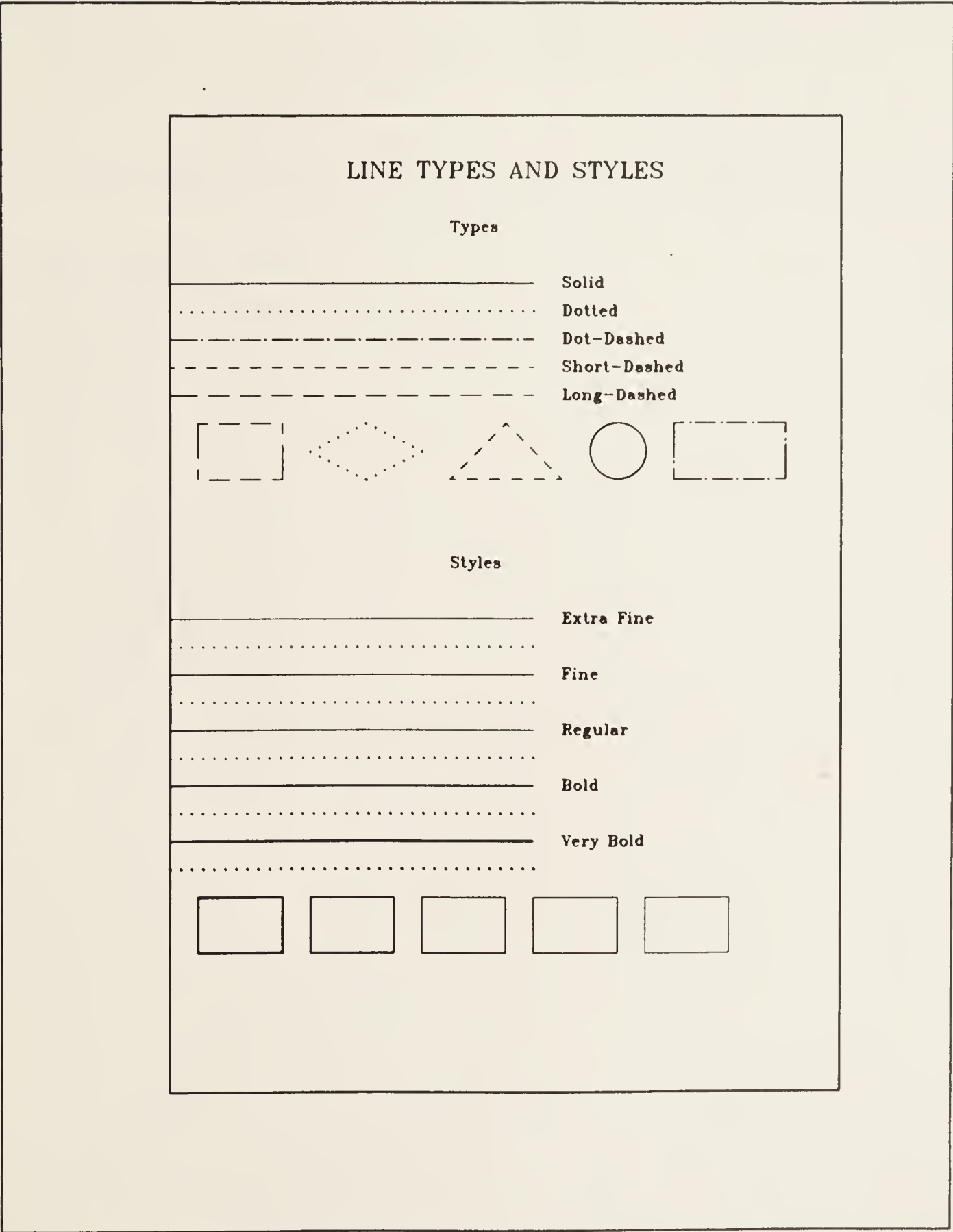
|                |                  |                     |
|----------------|------------------|---------------------|
| 8p TIMESROMAN  | .1 inch COURIER  | .3 cm NEWSGOTHIC    |
| 10p TIMESROMAN | .15 inch COURIER | .4 cm NEWSGOTHIC    |
| 12p TIMESROMAN | .2 in COURIER    | .5 cm<br>NEWSGOTHIC |

6p NEWSGOTHIC

16p TIMESROMAN

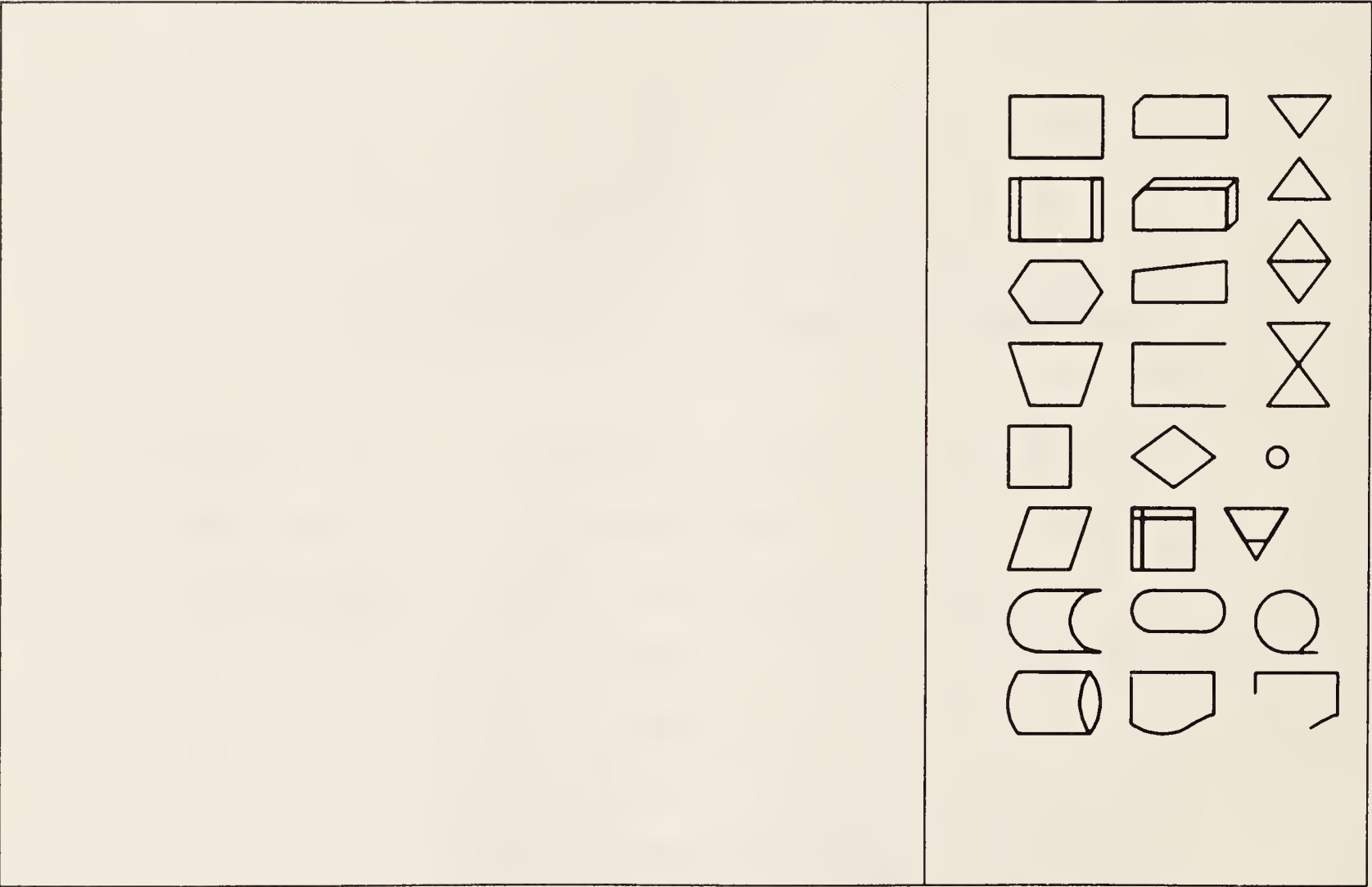
|  |   |   |
|--|---|---|
| 12p NEWSGOTHIC<br>left justified <div> the quick<br/> brown fox<br/> jumps over<br/> the lazy dog </div> | 12p COURIER<br>centered <div> the quick<br/> brown fox<br/> jumps over<br/> the lazy dog </div> | 12p TIMESROMAN<br>right justified <div> the quick<br/> brown fox<br/> jumps over<br/> the lazy dog </div> |
|--|---|---|

Line Styles and Types (see attached diagram)





Flowchart Template (see attached diagram)



Example of a Full Page with Mixed Text and Graphics (*see following page*)

6e

## Chapter 8

### MUNITIONS MAINTENANCE ACTIVITIES

8-1. General. This chapter applies to munitions maintenance activities which are not organized under an aircraft, ICBM, or CEM maintenance activity. These units may be organized as a munitions maintenance squadron, munitions branch or section, ammunition supply squadron, an aviation depot squadron, or EOD activity. Their functions may range from performing WRM storage and housekeeping to supporting aircraft of another unit or command. The major command must identify these units as type 1, 2, 3, or 4 to indicate the specific management procedures to be followed. Units categorized as type 1 will comply with the provisions of this chapter, volume II and volume VI.

8-2. Function. The munitions activities managed in accordance with this chapter may accomplish organizational, intermediate, or depot level maintenance, as applicable, for conventional and nuclear munitions, missiles, and associated support equipment within the capability of assigned specialties, equipment, and facilities. Munitions accountable supply management provides for the reporting and disposition of nuclear, conventional, and chemical munitions. Volume VI, chapter 1 provides further guidance on functional responsibilities.

8-3. Types of Independent Munitions Maintenance Units. Each IMMUs will be designated by type based on maintenance manpower authorizations. Major commands may task IMMUs to operate under the procedures normally specified for an activity with greater maintenance authorizations.

a. The following categories (by total unit manpower authorizations in maintenance functional account codes) will be used as a guide:

- (1) Type 1, 155 or more authorizations.
- (2) Type 2, 50 to 160 authorizations.
- (3) Type 3, 40 to 55 authorizations.
- (4) Type 4, 45 or less authorizations.

b. Major commands will include IMMUs in the list of units by type, published in accordance with the instructions in chapter 1.

8-4. Organization. The munitions activity may be organized as a squadron, branch or section. Authorized functions may include any or all of those listed in volume VI. In types 2, 3, and 4 units, functions will be consolidated to reduce supervisory overhead, whenever possible.

8-5. Locations of IMMUs Sites. Distribution of Unit Types in the continental United States is indicated in Figure 1.

8-6. Special Procedures and Exemptions. In conjunction with exemptions and modifications, per volume II, to procedures authorized by unit type, the following guidance is provided:

a. The following paragraphs of volume II, and rules of table 1-1, are specifically exempted or modified for operations of an IMMUs regardless of the type unit designation:

- (1) 2-17 is exempted.
- (2) 2-29 is exempted. The procedures listed in volume VI for control will be used.
- (3) 2-40 and 2-41 are exempted.
- (4) 2-87 through 2-89, 2-100 and 2-103 are exempted. The procedures listed in TO 00-20-3 will be used.
- (5) 2-90 is exempted. The procedures listed in volume VI for control will be used.
- (6) 3-10 is modified. The technical order distribution office will be established in the unit quality control, except for the 60-series technical orders which will be established in the EOD branch.
- (7) Table 1-1, rule 33. This rule does not apply. Semiannual activity inspections will be performed.

b. Conventional storage areas which have railroad or barge loading facilities or a large volume of incoming and outgoing shipments are authorized to establish a shipping and receiving section. Local procedures will be developed to establish responsibilities and procedures for this section. The shipping and receiving section will be organized under the maintenance and storage branch.

**Figure 1**  
**Independent Munitions**  
**Maintenance Units**



Distribution of IMMUs by Type



APPENDIX I

NOTES ON INSTALLATION OF GRAPHICS TERMINAL

The TIP buffers and baud rates should be set as for a non-graphics Data Media DNLS station, except for the baud rate for the Lineprocessor's Copy Printer port. These settings are summarized here.

7a

The alphanumeric display input/output should be at 9600 baud, so turn the Data Media's knob on the bottom left front panel to "SEL" for "Select." The "FULL DUPLEX" light found above the knob should also be lit; this is usually controlled by a key on the keyboard.

7a1

The Tektronix display input/output should also be at 9600 baud. There is a panel of three knobs and a switch on the back of the Tektronix display (sometimes, behind the rear cover). Set the TRANSMIT BAUD RATE knob to 9600 and the RECEIVE BAUD RATE knob to 9600. Also at this location, set the DUPLEX knob to FULL-NORMAL. Set the CARRIAGE RETURN switch to LF (not CR/LF).

7a2

TIP Tailoring:  
Input from Lineprocessor: 31 octal words minimum  
Output to Lineprocessor: 163 octal words maximum

7a3

Baud Rate Settings in Lineprocessor:  
(Thumb switches & labels found under top cover of Lineprocessor)

7a4

| Lineprocessor<br>Input/Output | Baud<br>Rate | Thumb Switch<br>Label | Thumb Switch<br>Setting |
|-------------------------------|--------------|-----------------------|-------------------------|
| to TIP                        | 1200         | EPS                   | 2                       |
| to Display                    | 9600         | DIS                   | 5                       |
| from Display                  | 9600         | D1R                   | 5                       |
| to/from Tektronix             | 9600         | CP                    | 5                       |
| from TIP                      | 1200         | EPR                   | 2                       |
| from TIP                      | 1200         | EPR                   | 2                       |

[Note: When the Tektronix is not connected to this workstation, or a teletype printer is connected in its place, the CP thumb switch should be set to 0 - for 300 baud]

7b

Plug the foot switch into the circular outlet on the back of the Lineprocessor.

7c

Connections from the Tektronix Display 4012 or 4014:

7c1

The thin cord from rear of diplay, nearest floor, plugs into wall socket. The thin cable from middle rear of display plugs into CP (Copy Printer) port of Lineprocessor.

7d

Tektronix hard copy unit:

7d1

The medium fat cable connects from the upper rear of Tektronix display to leftmost plug (TERM1) on rear of hardcopy unit (TERM1 button down). The biggest fat cable with rounded plug on one end connects from hardcopy unit to wall socket.

7e

The following Graphics command writes a test pattern on the screen to verify the hardware configuration. To start up Graphics so you can use this command, first read section <2> on the Tektronix equipment, section <3> on entering Graphics, and section <5l> for terminal type setting.

7e1

Test (\*\* Configuration Checkout \*\*) OK

Appendix II: Commands List

## APPENDIX II COMMANDS LIST

Listed here are the commands found in the Graphics Subsystem and explained in this document. Other commands common to all subsystems--such as Jump, Quit, Goto, Help--are not listed here, but are available in Graphics. Explanations of the standard syntax conventions used here can be found in the NLS COMMAND SUMMARY (24831,).

|   |     |
|---|-----|
| Attach (from the last line to) BUG OK   | 8b  |
| Backspace (the line at) BUG OK  | 8c  |
| Change Character (height to) CONTENT (for statement at) BUG OK  | 8d  |
| Change Emphasis (to) TEXTSTYLE (for statement at) BUG OK<br>TEXTSTYLE = Light / Medium / Bold / Proportional (spacing) / Monospaced / Straight /<br>Slanted / Not (underlined) / Underlined                               | 8e  |
| Change Font (to) FONT (for statement at) BUG OK<br>FONT = Timesroman / Newsgothic / Courier / Film / Directory / Ocrb (Optical Character<br>Recognition font B) / Nmamicrofont (National Microfilm Association microfont) | 8f  |
| Change Justification (to) Center (for statement at) BUG OK  | 8g  |
| Change Justification (to) Left (for statement at) BUG OK  | 8h  |
| Change Justification (to) Right (for statement at) BUG OK   | 8i  |
| Change Line Style (to) Bold (for) LINEWORK (at) BUG OK<br>LINEWORK = Rectangle / Point / Line / Triangle / Figure / Diamond / Circle / Arrowhead  | 8j  |
| Change Line Style (to) Extra (fine) (for) LINEWORK (at) BUG OK  | 8k  |
| Change Line Style (to) Fine (for) LINEWORK (at) BUG OK  | 8l  |
| Change Line Style (to) Regular (for) LINEWORK (at) BUG OK   | 8m  |
| Change Line Style (to) Very (bold) (for) LINEWORK (at) BUG OK   | 8n  |
| Change Line Type (to) Dot-dashed (for) LINEWORK (at) BUG OK   | 8o  |
| Change Line Type (to) Dotted (for) LINEWORK (at) BUG OK   | 8p  |
| Change Line Type (to) Long-dashed (for) LINEWORK (at) BUG OK  | 8q  |
| Change Line Type (to) Short-dashed (for) LINEWORK (at) BUG OK   | 8r  |
| Change Line Type (to) Solid (for) LINEWORK (at) BUG OK  | 8s  |
| Copy FIGURE (at) BUG (from) BUG (to) BUG OK<br>FIGURE = Statement / Rectangle / Point / Line / Triangle / Figure / Diamond / Circle /<br>Arrowhead  | 8t  |
| Copy Group (of figures in the window at) BUG (and) BUG (from) BUG (to) BUG OK   | 8u  |
| Create Diagram (at statement) DESTINATION OK  | 8v  |
| Delete Edge (at) BUG OK   | 8w  |
| Delete FIGURE (at) BUG OK   | 8x  |
| Delete Group (of figures in the window at) BUG (and) BUG OK   | 8y  |
| Input (SPL diagram from file) CONTENT (block number) CONTENT (at statement) DESTINATION OK  | 8z  |
| Insert Arrowhead (pointing) Down (at) BUG OK  | 8a● |
| Insert Arrowhead (pointing) Left (at) BUG OK  | 8aa |
| Insert Arrowhead (pointing) Right (at) BUG OK   | 8ab |
| Insert Arrowhead (pointing) Up (at) BUG OK  | 8ac |
| Insert BUG (and) BUG OK   | 8ad |
| Insert Circle (center) BUG BUG OK   | 8ae |
| Insert Circle (center) BUG Horizontally (tangent to) BUG OK   | 8af |

## Appendix II: Commands List

|   |     |
|---|-----|
| Insert Circle (center) BUG Vertically (tangent to) BUG OK                     | 8ag |
| Insert Diamond (top at) BUG (bottom at) BUG (side at) BUG OK                  | 8ah |
| Insert Edge (perpendicular to) BUG OK   | 8ai |
| Insert Horizontal (line starting at) BUG (ending) BUG OK                      | 8aj |
| Insert Line (between) BUG (and) BUG OK  | 8ak |
| Insert Point (at) BUG OK  | 8al |
| Insert Rectangle (corner at) BUG (opposite at) BUG OK                         | 8am |
| Insert Square (upper left corner at) BUG (size) BUG OK                        | 8an |
| Insert Statement (into the window at) BUG (and) BUG CONTENT OK                | 8ao |
| Insert Triangle (pointing) Down (top) BUG (one base point at) BUG OK          | 8ap |
| Insert Triangle (pointing) Left (top) BUG (one base point at) BUG OK          | 8aq |
| Insert Triangle (pointing) Right (top) BUG (one base point at) BUG OK         | 8ar |
| Insert Triangle (pointing) Up (top) BUG (one base point at) BUG OK            | 8as |
| Insert Vertical (line starting at) BUG (ending) BUG OK                        | 8at |
| Label (diagram at) BUG (with) CONTENT OK                                      | 8au |
| Move FIGURE (at) BUG (from) BUG (to) BUG OK                                   | 8av |
| Move Group (of figures in the window at) BUG (and) BUG (from) BUG (to) BUG OK | 8aw |
| Output (diagram at) DESTINATION (to COM file) CONTENT                         | 8ax |
| Portray (diagram at statement) DESTINATION (in graphics window) BUG           | 8ay |
| Reset Drawspecs OK  | 8az |
| Set Arrowhead (height) CONTENT (width) CONTENT                                | 8ba |
| Set Character (height) CONTENT  | 8bb |
| Set Emphasis TEXTSTYLE OK   | 8bc |
| Set Font FONT OK  | 8bd |
| Set Grid (size) CONTENT   | 8be |
| Set Justification Center OK   | 8bf |
| Set Justification Left OK   | 8bg |
| Set Justification Right OK  | 8bh |
| Set Line Style (to) Bold OK   | 8bi |
| Set Line Style (to) Extra (fine) OK   | 8bj |
| Set Line Style (to) Fine OK   | 8bk |
| Set Line Style (to) Regular OK  | 8bl |
| Set Line Style (to) Very (bold) OK  | 8bm |
| Set Line Type (to) Dot-dashed OK  | 8bn |
| Set Line Type (to) Dotted OK  | 8bo |
| Set Line Type (to) Long-dashed OK   | 8bp |
| Set Line Type (to) Short-dashed OK  | 8bq |
| Set Line Type (to) Solid OK   | 8br |
| Set Margin Bottom BUG OK  | 8bs |
| Set Margin Top BUG OK   | 8bt |
| Set Margin Left BUG OK  | 8bu |
| Set Margin Right BUG OK   | 8bv |
| Set Margin Off OK   | 8bw |
| Set Margin On OK  | 8bx |
| Set Terminal (type) T2 OK   | 8by |
| Set Terminal (type) T4 OK   |     |



Appendix II: Commands List

|   |     |
|---|-----|
| Set Viewgraph (mode on/off) Off OK  | 8bz |
| Set Viewgraph (mode on/off) On OK   | 8c● |
| Show Drawspecs OK   | 8ca |
| Show Grid (in the window) BUG (other corner) BUG OK                         | 8cb |
| Show Specific (drawspecs for) FIGURE (at) BUG OK                            | 8cc |
| Test (** Configuration Checkout **) OK                                      | 8cd |
| Update (graphics display) OK  | 8ce |
| Xtend Invisibly (the line at) BUG (to) BUG OK                               | 8cf |
| Xtend Visibly (the line at) BUG (to) BUG OK                                 | 8cg |
| Zoom (or move image) BUG (to) BUG OK  | 8ch |
| Zoom (or move image) BUG (to) Center OK                                     | 8ci |
| Zoom (or move image) Full (size of the margins) OK                          | 8cj |
| Zoom (or move image) In OK  | 8ck |
| Zoom (or move image) Out OK   | 8cl |
| Zoom (or move image) To (window) BUG (one corner) BUG (other corner) BUG OK | 8cm |
| . (Show Grid in the window) BUG (other corner) BUG OK                       | 8cn |



